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GRASSES AND FORAGE PLANTS

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GRASSES AND FORAGE PLANTS.

BY B. C. PITTUCK.

Texas, up to the past few years, has sadly neglected the introduction of new species of pasture grasses and forage crops. The graziers of our great State have been very determined in their views that "the work of nature can not be improved by the hands of man." The large land holdings caused this theory to perpetuate itself for many years without any attempt whatever at successful contradiction. But the increase in population and the division of these large farms and ranches into smaller land holdings is changing the system of farming for the Texas agriculturist from extensive to intensive. Competition has driven him to exertion. With the help of man, nature's resources have been found to be inexhaustible. As it is now, in many sections, he can not afford to pasture his stock on large pastures—land is too valuable. He must force a smaller acreage to yield as much as twice that amount did before. To do this profitably the farmer must, of necessity, study his land and crops of various sorts suited to it. He must also recognize the fact that rotation plays a very important part in his ultimate success and the condition of his land. The most successful farmers know the feeding habits of each plant grown, that they may resist or counteract the ill effects of partial feeders.

A necessary adjunct to every farm is a permanent pasture of nutritious grasses, also green fodder for winter feed. With our large number of grasses, ranging in growth from early spring to late winter, with proper care and selection our farmers should be able to increase the feeding power of their native pastures two-fold. The prairie regions of Texas are generally rich soils, and make an excellent growth of native grasses under ordinary circumstances, but in many cases these have been improved by seeding and light fertilizer application in the form of fine manure. A too heavy application has been found to be non-beneficial, owing to a tendency to thin the grasses, producing an uneven growth. We do not advocate changing native pastures, in every case, into new pastures of new grasses, but by proper selection new species can be introduced into these pastures, thereby greatly improving them.

To make an experiment as to the adaptability of grasses and forage plants of general interest, the investigator finds himself contending with many variable conditions within our State. The climate, soil, and elevation above the sea level have a wonderful range. Along our Gulf coast a humid, semi-tropical climate is met, but on pushing some 400 miles further north or west, we can perceive a marked change in temperature. Beginning on our southeastern border, the altitude increases to the west and north; our rainfall varies from 40 and 50 inches on the eastern

border to 4 and 5 inches on the west; the soil changes gradually from sandy through the different grades of loams and clays, and back again to sand, with surprising abruptness. With such conditions to combat, much study is necessary to properly adjust the plants most suitable to each locality, and it can only be accomplished by an extensive system of experimental investigation carried on among and by the farmers themselves. This character of experimental work with us has been denominated "co-operative experimental investigation," and is as largely as possible carried on by the farmers of our State who have realized the necessity of such work in their several communities. Although this phase of our experimental work is in its infancy, we feel sure that the community interests will continue the demand for such work, and of itself insure its ultimate success. So far the work during the past year in this line has been more of an awakening nature to the farmer than anything else. His inexperience in experimental work rendered the results, generally speaking, of little value, yet the coming year promises data fully worth the publishing and of considerable interest to the entire State.

A large number of the grasses, including many of the common cultivated clovers and legumes, and many rare hay plants, on our experimental plots during 1897, were gathered and supplied by special agents of the United States Agricultural Department (at Washington, D. C.), and furnished us for the purpose of investigating their merits in this State.

The grasses and forage plants were all planted during the months of March and April. An earlier date was preferred, but owing to the late arrival of seeds was impossible. During the summer, fall, and winter, seeds from many varieties were gathered for replanting during the season of 1898, all of which were destroyed in the fire of April 5, which resulted in a total loss of a barn and appurtenances. This was a severe loss to our grass and forage experiments, because many interesting experiments will be thwarted for the present, owing to a lack of seed to replant many promising species during the season of 1898.

TRUE GRASSES.

AGROPYRON.

*A. repens** (Couch Grass; Quack Grass).—Germinated March 20 to poor stand and slow growth. This grass, by May 1, 1898 (6 to 8 inches high), has formed a dense sod by means of root stocks. Very succulent and nutritive. This grass is considered a pest in most sections of the United States, yet owing to its nutritive value and permanency, and the fact that horses and cattle are very fond of it, we can not but feel that it has an unmistakable value in meadows and pastures. Yet care must be exercised to prevent its establishing a firm growth in cultivated fields or prospective fields, as it is difficult to eradicate and chokes out other plants by its dense sod.

*A. tenerum** (Slender Wheat Grass).—Germinated March 21 to good stand; said to be a variety of A. repens, but differs from it by lacking root stalks, growing in bunches. Grew to a height of 4 inches by May 9. Seeds ripened during July, after which very little feeding value can be attached.

A. divergens (Wire Bunch Grass). Bulletin No. 5, U. S. Dept. Agr., P. H. Rydberg and C. L. Shear.

A. spicatum (Western Wheat Grass). Bulletin No. 5, U. S. Dept. Agr., P. H. Rydberg and C. L. Shear.

*Seed difficult to obtain. Seed-houses do not handle them. Must be obtained through special agents.

*A. pseudorpens.**—Germinated March 23 to poor stand and disappeared early during the summer.

*A. divergens** (Wire Bunch Grass).—Germinated April 2, disappearing early during the summer.

*A. acutum.**—Germinated March 20 to fair stand; fine leaved; bunchy; grew to a height of 3½ inches by May 28th. Matured its seed during latter part of July, after which it will not stand grazing.

*A. spicatum** (Western Wheat Grass).—Germinated April 2 to poor stand, but good growth. May 1, 1898, 8 inches high, of good grazing qualities and nutritive value. Close sod and vigorous growth.

*A. richardsonii.**—Germinated March 23 to perfect stand and excellent growth.

ANDROPOGON.

*A. cinhatus.**—Germinated March 25 to poor stand and slow growth. May 1, 1898, 12 inches high, but only a scattering stand.

A. purinciales and *A. nutans.**—Germinated March 25 to poor stand, disappearing by midwinter.

The Andropogons are perennial grasses and are valuable under many circumstances in forming permanent meadows or pastures. They are rough, wiry, tall grasses, and when kept grazed down are well liked by stock. It fails to respond to cultivation in a profitable manner.

ALOPECURUS.

*A. occidentalis** (Rocky Mountain Foxtail).—This grass, which germinated April 5 to a poor stand, is indigenous to the region lying along mountain streams in Montana and Wyoming and produces a good hay. This grass disappeared here early in the fall.

BOUTELOUA.

The genus Bouteloua comprises the most important grasses of our Western ranges—Texas, Indian Territory, New Mexico, Nebraska, Montana. They are perennials, growing from 10 to 15 inches high, with slender leaves of a light green color. It is the grasses of this genus that our stockmen of the West look to for winter pasturage for their cattle. These grasses are seldom cut for hay, but they are self-curing on the ground, retaining their nutritive qualities for winter pasturage. Stock are very fond of them and will pick out these grasses in preference to all other native grasses growing among them. These grasses, especially B. oligostachya, are frequently confused with the Buffalo grass (Buchloë dactyloides), which is one of the important grasses of the Western plains, but with a growth differing entirely from the Boutelouas. Buffalo grass grows in small tufts, seldom more than 4 or 5 inches in

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height, which renders it unsuited for other purposes than pasturage. It seeds itself well and will propagate itself by means of off-shoots or runners, similar to Bermuda grass.

The Boutelouas promised well at this Station during the season of 1897, especially B. oligostachya, making excellent growth after a March planting, followed by a late fall, after which all growth was hindered. During the winter the grasses afforded excellent pasturage, and up to May, 1898, was in perfect condition.

*B. oligostachya** (Mesquite Grass; Grama Grass.)—Planted March 3, 1897, germinated March 29 to a perfect stand and rapid growth; average height, May 9, 4 inches; nineteen days later, 8 inches; average height April 1, 1898, 12 inches, with strong growth and fine grazing qualities.

*B. racemosa** (Mesquite Grass; Tall Grama Grass.)—Planted March 3, 1897; germinated March 21 to a fair stand and slow growth; average height May 9, 3 inches; nineteen days later, 6½ inches; color and quality poor; growth during spring of 1898 is better. Grazing qualities good; well established turf.

*B. jincifolia,** *B. rothrockii,** and *B. eripoda.**—Planted March 3, 1898, germinating to a poor stand and slow growth; poor color and quality. Of these three varieties, none grew over 3½ inches, the last disappearing entirely and the former reaching a height of 2½ inches by May 28.

B. oligostachya (Mesquite Grass; Grama Grass). Bulletin No. 5, U. S. Dept. Agr., P. H. Rydberg and C. L. Shear.

BROMUS.

B. uniloides (Rescue Grass; Schrader's Grass.)—Annual. Planted March 3; germinated March 21 to a perfect stand; growth rapid to May 28 (10 inches); quality good. This grass does well and responds to cultivation. A winter grass, maturing its seed in this section about May 1. Best growth made during the cooler months. Under favorable conditions it can be cut as hay, but its variable growth according to seasons renders it a much better grass used in mixtures with Bermuda and vetches for pasturage. During this spring this grass grew to a height of 12 inches. It must not be cut or pastured after April, but left to re-seed itself. It stands dry climates well and grows on almost any soil, but prefers moist, rich soils. Seed may be obtained of the Texas Seed and Floral Co., Dallas, Texas.

*B. carinatus.**—Planted March 3; germinated March 20 to a very poor stand; growth poor, reaching a height of 5 inches by May 28.

*B. purgans.**—Planted March 3; germinated March 20 to poor stand; growth very slow; average height May 28, 2½ inches.

*Seed difficult to obtain. Seed-houses do not handle them. Must be obtained through special agents.

*B. ciliatus.**—Planted March 3; germinated March 24 to a poor stand; growth very slow; average height by May 28, 1¼ inches. Of no agricultural value here.

*B. adoensis.**—Planted March 3; germinated March 19 to a perfect stand; growth rapid, but arrested by rust about middle of April; average height May 28, 6 inches.

*B. tectorum.**—Planted March 3; germinated March 19 to perfect stand; growth slow; average height May 28, 5 inches.

B. inermis (Hungarian or Awnless Brome).—Perennial. Planted March 3; germinated to poor stand; growth slow, but of good quality; average height May 28, 5 inches. This grass is the principal forage crop of parts of Hungary and is said to do well on land too poor to support any other grasses. The drouth and hot sun affected it very much here, as the seed require a low temperature for successful germination. Seed may be obtained from J. M. Thorburn & Co., 15 John Street, New York.

ELYMUS.

*E. virginicus** (Terrell Grass).—Perennial. Germinated March 27 to poor stand and slow growth. This grass does well along the banks of streams and ditches, and in many portions of the Southern States forms a large part of the native pastures and is of considerable value for winter grazing. Some authorities have stated that it would probably do well under cultivation, but at this Station it failed to respond to such treatment. It grows well on poor land and makes a coarse hay, but in the green stage stock are very fond of it.

E. canadensis (Wild Rye). Bulletin No. 5, U. S. Dept. Agr., P. H. Rydberg and C. L. Shear.

*E. gigantis.**—Perennial. Germinated March 23 to good stand, but slow growth; height by March 28, 3½ inches; May 1, 1898, 2½ feet high. Coarse leaves, of fair quality for hay.

*E. canadensis** (Wild Rye.)—Germinated March 23 to good stand. A coarse grass, used in some localities in the West for hay. Badly affected by rust during April.

ERAGROSTIS.

*E. abyssinica.**—Annual. Planted March 3 and germinated to perfect stand March 18. This grass reached a height of 2 feet by May 28. Long, slender, nutritious leaves, of remarkable value for hay. Planted in drills, this grass will yield an enormous amount of hay of the best quality. It matures a large amount of seeds, which were collected last summer, which we expected to plant again and also distribute, but all were lost by fire this spring. This

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grass is a native of Abyssinia. The hot summer sun and winds had no effect on its growth and matured its seed by the 1st of July.

*E. Neo Mexicana.**—Germinated March 21 to very poor stand, but rapid growth, maturing during the early part of May. Of little agricultural value.

FESTUCA.

*F. arundenacea.** — Germinated March 23 to good stand and fair growth, but ruined by rust at an early date.

F. pratensis.—Germinated March 23 to a good stand, growing to a height of 3 inches by May 28. It affords good, early fall pasturage of good quality for cattle. It did not do as well here as would be expected. Seed may be obtained from J. M. Thorburn & Co., 15 John Street, New York.

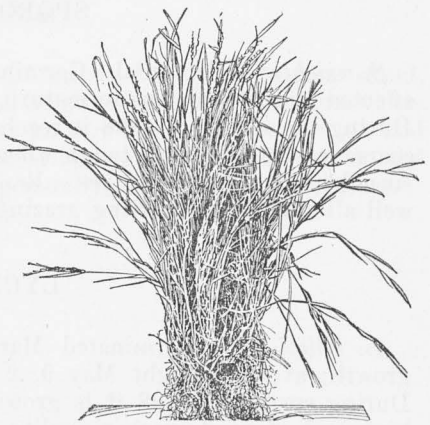
PANICUM.

*P. frumentaceum.**—Annual. Germinated March 23 to good stand and rapid growth. Grew to a height of 15 inches by May 28. Failed to re-seed itself.

*P. crus-gali** (Barnyard Grass).—Annual. Germinated March 30 to a perfect stand, and made rapid growth. This grass is considered a pest by some farmers, but notwithstanding its coarse leaves it makes a fair yield and quality of hay. It re-seeds itself easily along the humid portions of the Southern States.

*P. rigatum.**—Annual. Germinated March 26 to an imperfect stand, but rapid growth. Very coarse and straight leaves about 10 inches long.

*P. texanum** (Colorado Bottom Grass; Austin Grass; Texas Millet; Concho Grass).—Germinated March 24 to a perfect stand and rapid growth, and grew to a height of 30 inches by the middle of June. A native of Texas, and prized very highly along the river bottoms of Central and Western Texas as a valuable hay plant. It stands drouth well, but does best on the alluvial soils of our river bottoms. It yields a large quantity of nutritious hay, but is objected to by many on account of its difficult eradication. It is a near relative to crab grass.



P. texanum (Colorado Bottom Grass); Austin Grass; Texas Millet; Concho Grass.

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*P. colonum.**—Annual. Germinated to poor stand March 30, and disappeared during hot weather.

POA.

P. pratensis (Kentucky Blue Grass).—Germinated April 2 to poor stand. We have never been able to grow this grass successfully at this Station, and as a rule the stand disappears early in the summer. Seed may be obtained from the Texas Seed and Floral Co., Dallas, Texas.

P. arachnifera (Texas Blue Grass).—Germinated March 30 to good stand, but slow growth. This grass is indigenous to Central Texas and is essentially a winter growing grass, ripening its seed early in April, after which it loses its vitality until the fall rains begin. It is valued very highly in most sections, as it bears heavy pasturage and makes a dense sod in a remarkably short period. The introduction of this grass into many parts of our State would prove a boon to farmers and be a valuable acquisition to their winter pasturage facilities. Seed may be obtained from D. Landreth & Sons, Philadelphia, Pa.

ANTHOXANTHUM.

A. odoratum (Sweet Vernal).—Germinated March 23, but did not do well, being badly killed out by the drouth and hot sun.

Festuca elatior (Tall Fescue), Trifolium hybridum (Alsike Clover), Large Red Clover, Trifolium repens (White Dutch Clover), suffered from the drouth and sun, but have made better growth at this place than during previous years.

SPOROBOLUS.

*S. wrighti.**—Perennial. Germinated April 2 to poor stand, and badly affected by rust previous to maturity, which did not prevent its seeding. During the spring of 1898 it reached a height of 3 feet, with long and coarse leaves, seemingly tough when left to grow old, but nutritious and succulent in its early stages. Resists drouth well and as a rule holds well all summer, admitting grazing during that time.

LYCERUS.

*L. phleoides.**—Germinated March 20 to a perfect stand and fair growth; average height May 9, 2 inches, and by May 28 8½ inches. During spring of 1898 it is growing vigorously, from 8 to 12 inches high and of good grazing quality.

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LEPTOCHLOA.

*L. imbricata.**—Germinated April 5 to poor stand, but rapid growth. Of good quality. By May 28 it reached a height of 8 inches, but did not mature, being choked out by native grasses and weeds.

CHACTOCHLOA.

*C. glauca.**—Germinated March 21 to good stand and rapid growth; bunchy, but coarse. Grew to a height of 13 inches by May 28. Of little value for hay, and will not stand much pasturing.

LOLIUM.

L. perenne (Italian Rye Grass).—Perennial. Germinated March 21 to good stand, but slow growth, reaching a height of 3 inches by May 28. Stood drouth well, but disappeared on first appearance of cold weather, and so far this spring has failed to appear. Seed may be obtained from J. M. Thorburn & Co., 15 John Street, New York.

TRITICUM.

*T. villosum.**—Germinated March 26 to perfect stand, but slow growth and of poor quality; coarse leaved, bunchy; height by May 28, 4 inches.

BULBIS.

*B. dactyloides** (Buffalo Grass).—Germinated April 5 to poor stand, disappearing after having grown to a height of 1 inch. This grass performs an important part in the great pasture lands of West Texas, and is a good pasture grass, but its popularity has been largely due to the fact that Bouteloua oligostachya is generally called the Buffalo grass.

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OTHER HAY AND FORAGE PLANTS.

SORGHUM.

The increasing usefulness of sorghum to the farmer and dairyman warrants the publication of data derived from experiments carried on at this Station during the season of 1897 on the growth of this plant under the influence of different methods of planting and rate of seeding. The dairymen and stockmen are in a position to use this crop more profitably than any other agriculturalists. With sorghum in this State the dairyman is able to furnish his cows with green food during the late summer and silage and hay during the winter and spring, while with the proper use of pasture grasses the "year of green feed" can be pieced out. For the stockman an excellent green and dry rough feed is secured in abundance and very cheaply. For the best results in dairying it is essential that the cows be given an abundance of green, succulent feed, and the dairyman is indeed fortunate who possesses permanent pastures of winter and summer growing grasses. But while the dairymen and cattlemen of our State find sorghum a valuable crop for soiling, hay and silage, our farmers do not find it any less profitable to themselves, and while it is not necessary that they grow sorghum in such large quantities, yet that which is grown brings the same returns under like conditions.

If the farmer raises 50 bushels of corn per acre and receives 50 cents per bushel, it brings him a total of $25.00 per acre in return for labor, etc. On one acre of land 4 tons of hay (first cutting) can be raised, which at the market price, $8.00, will bring him $32.00 per acre; or 12 tons of silage at $3.00 per ton, $36.00. This, followed by a second growth yielding two-thirds the previous amount, brings our total cash value per acre for sorghum much higher than corn. The farmer must have rough fodder for his cows and horses, and unless he has permanent meadows of good hay grasses, the growing of sorghum is his best crop. As a crop to follow on corn land, we find it one of the best. Care must be exercised in feeding of sorghum. Cattle are over fond of green sorghum, and will, if allowed, injure themselves by overfeeding or injudicious feeding. Wet and frosted sorghum especially should be avoided.

Sorghum is one of our heaviest soil feeders, and consequently its continuous growth on one piece of land will rapidly exhaust the food constituents of the soil. It is not advisable to grow more than two crops in succession on the same piece of land. Follow sorghum with oats, and alternate in the spring with peas, which restores the nitrogen to the soil. The idea prevalent among some farmers that sorghum poisons the land upon which it is grown, while not literally true, is true as far as exhaustion and inability to support plant growth properly is concerned. An extract from Bulletin 13 of this Station gives the relative quantities of nitrogen, phosphoric acid and potash removed from the soil by sorghum, wheat and corn:

"Sorghum, at the rate of 10 tons green material to the acre; wheat, 20 bushels; corn, 30 bushels.

	Sorghum.	Wheat.	Corn.
Phosphoric acid	38.5	16.77	11.91
Potash	94.0	22.40	13.30
Nitrogen	39.0	28.50	31.00

"From the table it seems the quantity of nitrogen removed by the three crops is nearly the same. The amount of phosphoric acid in the cane is considerably in excess, while the potash is four or five times as large.*** The estimates for the corn do not include the stalk, since, according to the almost universal southern practice, these are left upon the field. The quantities in the sorghum would be decreased somewhat if the leaves were left upon the ground.

"CONCLUSIONS ON SORGHUM.

"1. It is better, so far as nutrition is concerned, to let it nearly mature before cutting, but if intended for hay, it should be sown thicker and cut earlier.

"2. The saccharine varieties are to be preferred to the non-saccharine, but between the saccharines there seems to be little difference in nutritive ratio.

"3. It is an exhausting crop, removing more mineral matter from the soil than is removed either by corn or wheat.

"4. It is a good milk producer when fed in the green state with other dry feed. Its digestibility compares favorably with that of corn, except for the nitrogenous matter."

Broadcasted sorghum as tested during 1897 was planted April 10 and germinated April 16. Drilled sorghum was planted April 6 and germinated April 10. The entire season was favorable toward a good growth. Cultivation of drilled sorghum included harrowing the middles with an Orrick harrow on April 19; cultivated with Towers' "gopher" cultivator on April 27, and again with Victor four-shovel cultivator in May. Amber sorghum was used throughout the test.

INFLUENCE OF DEPTH OF PREPARATION ON RATE OF SEEDING.

When broadcasting sorghum at the rate of *four bushels* seed per acre, the best results were obtained on land plowed to a *depth of* 15 *inches* (using subsoil plow). Yield of cured hay per acre, 5.7 *tons.*

When broadcasting sorghum at the rate of *two bushels* seed per acre, the best results were obtained on land plowed to a *depth of* 5 *inches.* Yield of cured hay per acre, 6.4 *tons.*

When drilled in 3 *feet* 8 *inch rows,* at the rate of ½ *bushel* seed per acre, the best results were obtained on land plowed to a *depth of* 5 *inches.* Yield of cured hay per acre, 5.4 *tons.*

When drilled in 3 *feet* 8 *inch rows,* at the rate of *one bushel* seed per acre, the best results were obtained on land plowed to a *depth of* 5 *inches.* Yield of cured hay per acre, 3.7 *tons.*

When drilled in 3-*foot rows,* at the rate of *one bushel* seed per acre, the best results were obtained on land plowed to a *depth of* 15 *inches.* Yield of cured hay per acre, 5.3 tons.

In each instance where sorghum was drilled in 3 *feet* 8 *inch* rows, the resulting yields strongly favor seeding at the rate of ½ *bushel* per acre, against seeding at the rate of one bushel per acre, though a coarser quality of hay was produced from this seeding.

The following gives yield of broadcasted sorghum at different depths of plowing. The *first crop* was cut and cured as hay; *the second growth* was cut and used for silage. In calculating the money value, we assume the market price of sorghum hay as $8.00 per ton and silage as $3.00 per ton.

5-INCH PLOWING.

Broadcasted at the rate of 4 bushels seed per acre; yielded (first cutting) 5.3 tons hay, $42.40; 7 tons silage (second cutting), $21.00. *Total,* $63.40.

Broadcasted at the rate of 2 bushels seed per acre; yielded (first cutting), 6.4 tons hay, $51.20; 7.1 tons silage (second cutting), $21.30. *Total,* $72.50.

15-INCH PLOWING.

Broadcasted at the rate of 4 bushels seed per acre; yielded (first cutting), 5.7 tons hay, $45.60; 6.7 tons silage (second cutting), $20.10. *Total,* $65.70.

Broadcasted at the rate of 2 bushels seed per acre; yielded (first cutting), 4.8 tons hay, $38.40; 4.9 tons silage (second cutting), $14.70. *Total,* $53.10.

3-INCH PLOWING.

Broadcasted at the rate of 4 bushels seed per acre; yielded (first cutting), 4.7 tons hay, $37.60; 5.9 tons silage (second cutting), $17.70. *Total,* $55.30.

Broadcasted at the rate of 2 bushels seed per acre; yielded (first cutting), 5.3 tons hay, $42.40; 3.3 tons silage (second cutting), $9.90. *Total,* $52.30.

INFLUENCE OF DEPTH OF PLOWING ON METHOD AND RATE OF SEEDING.

5-INCH PLOWING.

Drilled in rows 3 feet 8 inches apart at the rate of ½ bushel seed per acre; yielded (first cutting) 5.4 tons hay, $43.20; 2.6 tons silage (second cutting), $7.80. *Total,* $51.00.

Drilled in rows 3 feet 8 inches apart at the rate of 1 bushel seed per acre; yielded (first cutting) 3.7 tons hay, $29.60; 2.1 tons silage (second cutting), $6.30. *Total*, $35.90.

Drilled in rows 3 feet apart at the rate of 1 bushel seed per acre; yielded (first cutting) 4.3 tons hay, $34.40; 1.8 tons silage (second cutting), $5.40. *Total*, 39.80.

15-INCH PLOWING.

Drilled in rows 3 feet 8 inches apart at the rate of ½ bushel seed per acre; yielded (first cutting) 5.2 tons hay, $41.60; 2.2 tons silage (second cutting), $6.60. *Total*, $48.20.

Drilled in rows 3 feet 8 inches apart at the rate of 1 bushel seed per acre; yielded (first cutting) 2.9 tons hay, $23.20; 1.9 tons silage (second cutting, $5.70. *Total*, $28.90.

Drilled in rows 3 feet apart at the rate of 1 bushel seed per acre; yielded (first cutting) 5.3 tons hay, $42.40; 1.6 tons silage (second cutting), $4.80. *Total*, $47.20.

3-INCH PLOWING.

Drilled in rows 3 feet 8 inches apart at the rate of ½ bushel seed per acre; yielded (first cutting) 4 tons hay, $32.00; 1 ton silage (second cutting), $3.00. *Total*, $35.00.

Drilled in rows 3 feet 8 inches apart at the rate of 1 bushel seed per acre; yielded (first cutting) 3 tons hay, $24.00; 1.8 tons silage (second cutting), $5.40. *Total*, $29.40.

Drilled in rows 3 feet apart at the rate of 1 bushel seed per acre; yielded (first cutting) 3 tons hay, $24.00; 2.1 tons silage (second cutting), $6.30. *Total*, $30.30.

MEDICAGO.

M. sativa. — Commonly known in this country and Europe as Alfalfa, Lucerne, Brazilian clover, Medick, French clover, Spanish trefoil, and Chilian clover. Although this plant is not a true clover, yet it belongs to the same natural family. Alfalfa has been grown very

M. sativa (Alfalfa). Bulletin No. 2, U. S. Dept. Agr., Jared G. Smith.

successfully here both from a spring and fall planting. Fall planting is preferred, provided the season is to be had which will allow the plant to establish a good root system before frost. Without season in this section, a fall planting amounts to a clear loss of seed and labor expended. Planted in the early spring, with a thorough preparation of the soil, this plant will make a strong growth and, unless drowned by heavy rains or injured by excessive heat previous to its firm establishment, will give one or two good cuttings during the first season. Alfalfa is a deep-rooted, perennial plant, often sending its feeders to a depth of 20 or 25 feet in favorable soils. It prefers a rich sandy soil underlaid by a permeable subsoil, and demands good drainage for best results. Our land is poor and, accompanied by a stiff blue clay subsoil, renders it, according to many authorities, totally unsuited for the growth of alfalfa. Yet we have a patch of alfalfa on the College farm which seems to grow better every year and establish a firmer growth every season. Before seeding this ground, the land was thoroughly plowed to a depth of 7 inches with turning plow, and stirred to a total depth of 15 inches by following in turning plow furrow with a subsoiler. The method of preparation assisted in lowering the water level and added considerable warmth to the land. Seed were sown in 18-inch drills at the rate of 20 pounds per acre. Nearly two tons cured hay per acre were cut from this land during the first season. The last cutting up to date gave $1\frac{3}{4}$ tons per acre, the stubble of which put out new growth to a height of 5 inches during the succeeding six days.

M. denticulata (Burr Clover). Bulletin No. 2, U. S. Dept. Agr., Jared G. Smith.

Alfalfa sometimes suffers from "root rot" or "blight," as does cotton, which is caused by the same parasite. This parasitic attack on alfalfa has somewhat dampened the ardor of many alfalfa growers and has caused much comment. Experiments by Professor Pammel, recorded in Bulletins 7 and 22 of the Texas Station, show plainly that the two diseases are one and the same. Salt has been used with variable results. We recommend a rotation of crops, following alfalfa with corn, oats, sorghum, or other grasses. Alfalfa planted where cotton root rot has been prevalent is liable to the disease.

Alfalfa is difficult to cure properly. The large number of tender, succulent leaves render the greatest care and best of weather necessary to save them. It is a very nutritious feed, both as hay and for soiling. Much care must be exercised in pasturing uninitiated cattle on an alfalfa

patch. An over-feed or injudicious feeding is liable to result in bloat among cattle and founder among horses. Wet alfalfa is injurious, and should be avoided. Sow broadcast at rate of 30 pounds of seed per acre. Seed may be obtained from any of our southern seed houses.

M. denticulata (Burr Clover).—Germinated March 21 to perfect stand, of rapid growth and good quality. This clover makes a wonderful growth in this section, remaining green and succulent during winter and up to May, when its seeds mature. In connection with Rescue grass and Bermuda it makes an almost continuous green pasturage. One objection to the Burr clover is that, although green and succulent, stock are not very fond of it, but will pick out other grasses in preference. At this station, parts of the campus are covered with this plant, mixed with Rescue grass and Bermuda. Our cattle are very fond of it. Seed may be obtained from the Texas Seed and Floral Co., Dallas, Texas.

EUCHLAENA.

E. luxurians (Teosinte).—This plant, of wonderful growth in this State as well as all the Gulf coast, is a close relative of our Indian corn. Germinating at this place on March 23, it grew to a height of 30 inches by May 28, and during June reached a height of 6¼ feet, with from 25 to 40 suckers to each stalk, and of equal height. Being a tropical plant, there are but few localities in the United States where this plant has matured its seed. It is eaten greedily by all stock, in the green state, and would in all probability cure into good hay, as it makes an enormous amount of green forage, the growth of which is not affected by the hot sun or winds, but is easily affected by early frost. Cut when young, for hay or green forage, it immediately puts out new growth, growing very rapidly. The acclimating of this plant, which is being attempted, will be a valuable acquisition to the forage plants of the Gulf coast region.

We extract the following from Bulletin 13, of this station:

"With the view of determining the value of teosinte as a feed-stuff, and its relative value during different stages of growth, beginning the 1st of August, samples were collected every ten days up to October 20th. The next and last sample was taken November 10th. The whole stalk was collected and analyzed. The plant scarcely reached maturity at any time, the season being too short.

	Number.	Water.	Fats.	Crude Fibre.	Albuminoids.	Nitrogen free extract.	Ash.
August 1	1	80.23	2.63	29.12	5.37	52.29	10.59
August 10	2	83.45	2.93	31.92	4.93	49.00	11.22
August 20	3	81.38	2.16	33.41	5.93	47.42	11.08
August 30	4	80.60	2.23	32.91	6.25	48.01	10.58
September 10	5	78.79	1.68	33.40	7.12	45.78	12.02
September 20	6	83.06	1.63	35.44	6.81	44.35	11.77
September 30	7	78.65	1.20	32.11	5.18	52.00	9.51
October 10	8	76.89	2.51	36.92	5.37	47.12	8.07
October 20	9	73.52	3.17	36.28	5.18	47.96	7.41
November 10	10	69.77	3.99	34.60	3.56*	50.03	6.92
Average	....	78.63	2.41	33.61	5.57	48.49	9.91

*Low..

* * * "After September 20, the plant seemed to reach no further development. The bottom leaves began to die, and there seemed to be little more growth.

"While there is no great difference in the analytical work, we believe that about the last of September, in this climate, would be the best time for harvesting the crop." * * *

Seed may be obtained from the J. Steckler Seed Co., New Orleans, La.

ATRIPLEX.

*A. canascens** (Shadscale).—Perennial. Germinated April 2, to poor stand, but fair growth; 12 inches high by May 28 and 5 feet high by May 1, 1898. Small leaves and twigs are very succulent. Best results are obtained with this plant on saline or alkaline soil.

*A. truncata** (Utah Saltbush).—Annual. Germinated April 2 to an imperfect stand, but rapid growth; 4 inches high by May 9, and 10 inches by May 28. Reddish color, tinged with green; succulent. Entirely disappeared by spring of 1898.

A. leptocarpum (Australian Saltbush). Bulletin No. 2, U. S. Dept. Agr., Jared G. Smith.

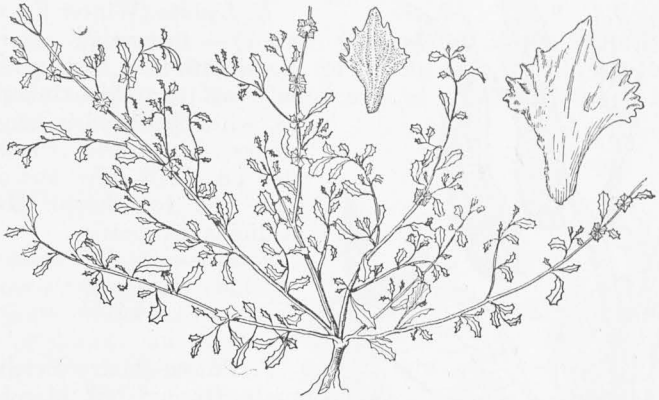
*A. leptocarpum** (Australian Saltbush.)—Annual. Germinated April 8 to fair stand and rapid growth; 8 inches high by May 9, and 12 inches high by May 28. Matured a large number of seed, but failed to re-seed itself so far. Very succulent and nutritious.

*A. halimoides**.—Annual. Germinated March 17 to poor stand, but rapid growth; 9 inches high by May 9, and 18 inches high by May 28. Disappeared during late winter.

A. semibaccatum (Australian Saltbush — Perennial. Germinated March 19 to poor stand, reaching a height of 10 inches, after which all growth ceased, and plants disappeared by mid-winter. This plant makes a better growth on alkaline soils than on our common dry soils. On such soils its growth renders it an important soil renovator, as it removes from the soil large quantities of injurious salts. For soiling sheep it is valuable, but should be fed with other coarse fodders. In this section the cold soil renders it an an-

*Seed difficult to obtain. Seed-houses do not handle them. Must be obtained through special agents.

nual. Seed may be obtained from J. M. Thorburn & Co., 15 John St., New York.



A. semibaccatum (Australian Saltbush). Bulletin No. 2, U. S. Dept. Agr., Jared G. Smith.

DESMODIUM.

D. tortuosum (Beggar Weed).—Germinated March 24 to a perfect stand and vigorous growth; average height May 28, 15 inches. At this place, unless cut early, its growth becomes weedy and stalks hard and woody. Height of plant at this place during 1897 was 4½ feet, of coarse weed.

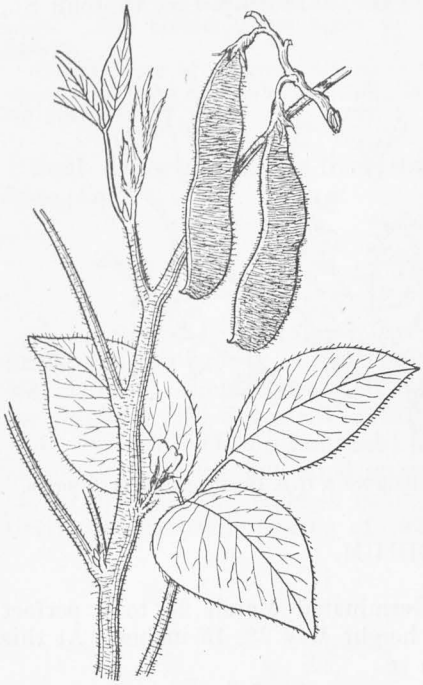
GLYCIENE.

G. hispada (Soy Bean, Soja Bean).—Germinated March 23 to good stand and rapid growth and of excellent quality. Average height May 28, 15 inches, but did not mature. Seed may be obtained from J. M. Thorburn & Co., New York.

LATHYRUS.

L. sylvestris (Flat Pea).—Perennial. Germinated March 25 to poor stand and slow growth. Average height May 28, 3 inches. Seed may be obtained from J. M. Thorburn & Co., New York.

D. tortuosum (Beggar Weed). Bulletin No. 2, U. S. Dept. Agr., Jared G. Smith.



G. hispada (Soy Bean, Soja Bean). Bulletin No. 2, U. S. Dept. Agr., Jared G. Smith.

EUROTIA.

E. Lanata (Winter Fat or Sweet Sage.) — Perennial. Germinated March 16 to a very poor stand, only two plants remaining by May 28, which reached a height of 5 inches. Its growth is most favorable on alkali soils, and is excellent feed for sheep. Has some medicinal properties.

VICA.

V. Villosa (Hairy Vetch.)—Annual. Germinated March 21 to perfect stand and rapid growth, height, and extra quality. An excellent soiling crop, although its extensive use by farmers is handicapped by the high price of seed and large quantity sown per acre necessary to a good yield. From 1 bushel to $1\frac{3}{4}$ bushels per acre should be sown, according to the fertility of the soil, and for summer crop should be sown during April in this State, and during latter part of August for winter forage. Seed may be obtained from J. M. Thorburn & Co., New York.

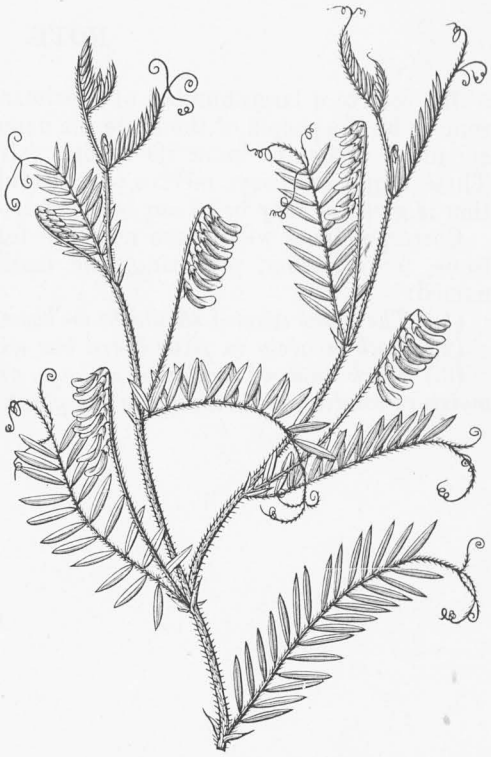
L. sylvestris (Flat Pea). Bulletin No. 2, U. S. Dept. Agr., Jared G. Smith.

SPERGULA.

S. arvensis (Spurrey).—Annual. Germinated March 23 to fair stand and rapid growth; sometimes used for soiling cows. Yield is poor. Sun-killed during middle of May. Seed may be obtained from J. M. Thorburn & Co., New York.

BRASSICA.

B. repens (Rape).—Only two plants appeared, but these were vigorous and hardy, producing an enormous number of green, succulent leaves, which have an undoubted value as green feed for sheep or cows. Should be sown in early fall. Farmers should try this plant. Seed may be obtained from J. M. Thorburn & Co., 15 John St., New York.



V. Villosa (Hairy Vetch). Bulletin No. 2, U. S. Dept. Agr., Jared G. Smith.

MELILOTUS.

M. alba.—Biennial. Germinated March 20 to perfect stand and extra growth. Fine quality. April 15, 1898 (3 feet high), an excellent cutting of hay was obtained. Melilotus will grow on thin lands and produce a heavy crop, but does best on calcareous soils. It is valued as a restorative crop on poor loams and lime lands. Sometimes two cuttings may be had from same piece of land first year, and second year's growth will furnish sometimes three cuttings. It will thrive on lime washes and dry prairie soils where many crops fail entirely. Seed for sale by Texas Seed and Floral Co., Dallas Texas.

MISCELLANEOUS.

Spring wheat.—L. C. Corbett, Morgantown, W. Va. Germinated March 19 to perfect stand and rapid growth, but was completely ruined by rust.

Hemp (Sun Hemp).—Germinated March 19, making rapid growth to a height of 4 feet, of good quality. A test of fibre was thwarted by samples being burned this spring.

Wisconsin Tree Bean.—L. C. Corbett, Morgantown, W. Va. Germinated to perfect stand; growth rapid and vigorous, making an early crop; first edible beans 45 days after germination. Very few immature pods. Yield, heavy.

NOTE.

We receive a large number of specimens of grasses and forage plants sent us by the people of the State for name, and in many cases the correspondent wishes to know its habits, value, and how it is propagated. These inquiries always receive our careful attention, and such information is given as may be at our command.

Correspondents will please note the following suggestions and directions, for selecting, preparing, and mailing specimens that are to be named:

(1.) *The plant selected should be in bloom.*

(2.) *Pack securely in paste-board box with damp cotton.*

(3.) *Mark name of sender on package, and in letter describe the soil and moisture conditions surrounding the plant.*

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